ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ
ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ ΥΛΙΚΩΝ

ΠΑΡΟΥΣΙΑΣΗ ΜΕΤΑΠΤΥΧΙΑΚΗΣ ΔΙΠΛΩΜΑΤΙΚΗΣ ΕΡΓΑΣΙΑΣ

Τίτλος

«Highly Active Catalysts (Pt, Cu, Ni) Supported on MTiO3 for Hydrogen Evolution»

της **Άννας Παναγιώτας Σουρή,** μεταπτυχιακής φοιτήτριας του

Τμήματος Επιστήμης και Τεχνολογίας Υλικών του Πανεπιστημίου Κρήτης

Επιβλέπων Καθηγητής: Γεράσιμος Αρματάς

Δευτέρα 19/12/2022

11:00

Η παρουσίαση θα πραγματοποιηθεί στην **αίθουσα Τηλε-εκπαίδευσης Ε-130, στο κτήριο του Τμήματος Μαθηματικών και Εφαρμοσμένων Μαθηματικών,** του Πανεπιστημίου Κρήτης.

ABSTRACT

Sustainable and clean energy is one of the main challenges that humanity has to overcome. Beginning with the notion of drifting away from fossil fuels that harm our planet, H_2 could be the right choice since it has the potential of green fuel. Its abundance, non-toxicity and the ability to obtain it through renewable sources have made it a compelling fuel candidate. Photocatalytic water splitting for H_2 production could play an important role for the aforementioned reasons. Hence, the need for more efficient and cost effective photocatalysts has been created. Additionally, the majority of photocatalysts used for H_2 production have a wide band gap, meaning that the visible part of the electromagnetic spectrum cannot be sufficiently exploited. Herein, a systematic investigation of the effect of metal nanoparticles as co-catalysts on the surface of $SrTiO_3$ for photocatalytic H_2 production under UV and visible light irradiation was done. Photodeposition, that is a simple process that does not require harsh conditions, was employed to deposit metals on the surface of $SrTiO_3$ (STO). Typically, noble metals are known to enhance the photocatalytic activity and the absorbance in the visible part of the spectrum. However, noble metals increase the cost due to their scarcity.

Therefore, three series of samples were synthesized STO-Pt, STO-Ni and STO-Cu with different metal loadings. The morphological characterization was done by Scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDX) and transmission electron microscopy (TEM). Optical characterization was done by Ultraviolet–visible spectroscopy (UV-Vis) and Time-Resolved Photoluminescence (TRPL). Moreover, impedance spectroscopy was used to draw a conclusion about the band positions of the samples. Photocatalytic experiments were carried out under solar and visible irradiation. The samples STO-0,4wt% Pt , STO-0,25wt% Ni and STO-1wt% Cu exhibited H_2 production of 632,2 µmoles, 171,6 µmoles and 138,8 µmoles at 2 hours of solar irradiation. Finally, the stability was also studied with the catalysts with Cu and Pt exhibiting good stability.